

THE ATMOSPHERIC TRACE MOLECULESPECTROSCOPY INVESTIGATION

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The Atmospheric Trace Molecule Spectroscopy (ATMOS) experiment was started more than ten years ago, as an investigation of the detailed chemical composition of the middle atmosphere. It is based on a Fourier transform spectrometer designed to obtain high resolution infrared spectra of the sun during orbital sunrise and sunset on board the Space Shuttle. It has been flown on three Shuttle missions: **Spacelab 3** in April 29- May 7, 1985, ATLAS-1 in **March** 24- April 2, 1992, and on ATLAS-2 in April 8 -April 16, 1993. The technique provides the capability to measure, near-simultaneously, some thirty atmospheric constituents, including many of the trace species involved in the **photochemical** processes which control stratospheric ozone levels. The first set of **measurements** from the **Spacelab 3** flight have been widely used to test **photochemical** models of the stratosphere. The later flights have augmented this first data set with measurements made under widely **different** conditions. The ATLAS-1 data was obtained relatively soon after the eruption of the Mt. **Pinatubo** volcano when there was still a significant aerosol **loading** of the lower stratosphere. The second **reflight** on ATLAS-2 provided a range of sunrise observations inside and outside of the residual Arctic polar vortex between latitudes of **60°** and 68° N. Some of the key scientific highlights will be discussed in terms of how these ATMOS measurements have improved our understanding of stratospheric processes, as well as some of the trends in stratospheric composition detected in these data.